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fertile, well-cultivated tract of country is visible. Kirkoswald is a neat, little village, belonging to the earl of Cassilis, whose suberb mansion of Culzean castle is in this vicinity. From Kirkoswald there is a smooth level road along the shore to Girvan, from whence we proceeded to Ballantrae, where the coach stops twenty minutes, which we spent agreeably in the Manse, where we were courteously and hospitably received by the Rev. Mr. D——, to whom I had been introduced some years ago. This pious and venerable gentleman is only the third minister of Ballantrae, since the revolution of 1688.

My companion, who had not before seen this part of the country, was delighted with its picturesque appearance; at Cairn we waited for dinner, which consisted of nice roasted mutton, and excellent fresh herrings. At seven, P. M. we arrived at Portpatrick, I invited a friend to the inn, where we spent a social pleasant evening.

Wednesday.—Portpatrick is a small sea-port town, over-hung with steep hills and rocks, close to the Irish channel. The entrance to the harbour is narrow and rocky, but the quay (on the top of which is a light-house) is one of the best in Great Britain, and was built at a very considerable expense about twenty years ago. The depth at high-water in this harbour, is about ten feet, and in high spring tides, sixteen feet. A little to the southward of Portpatrick, stands the ruined castle of Dunskye, boldly erected upon a precipitous rock, overhanging the sea. From this port the packet-boats regularly sail, with the mail, &c. to and from Donaghadee, from whence Portpatrick bears due E. by N. distance about eight leagues.* The packets are all Irish property, and registered for the port of Donaghadee. Portpatrick is the seat of a custom-house, and the importation here of horses and oxen from Donaghadee and Bangor is very great. At Portpatrick are two commodious inns. A mail-coach is established here, and passes regularly to and from Carlisle, distance, 124 miles. For a more minute, and perhaps accurate account of Portpatrick, I refer my readers to the "*Statistical Survey of Scotland,*" in which will be found a description of this parish, by the learned and Rev. Doctor Mackenzie, minister thereof. Portpatrick is 140 miles from Edinburgh, 96 from Glasgow, and 83 from Dumfries. From Portpatrick, after a passage of two hours and twenty minutes, we landed at Donaghadee, where we reflected satisfactorily on our excursion, and where a comfortable room, a good dinner, excellent wine, &c. compensated for our boisterous passage, and gave us reason to thank Providence, that we were once more upon *terra-firma*. M.

Donaghadee.

For the Belfast Monthly Magazine.

IN our last number, having given an analysis of the new discoveries, with regard to potash, communicated by Humphrey Davy, to the Royal Society of London, which we extracted from the London Monthly Magazine, we now from the same publication, give an account of the properties and nature of the basis of Soda.

The basis or metallic substance obtained by decomposition, is a solid at the common temperature. It is white, opaque, and if examined, under a film of naphtha, has the lustre and general appearance of silver. It is exceedingly malleable, and is softer than any of the common metallic substances. It is a good conductor of electricity and heat, and small globules of it inflame, by the voltaic electrical spark, and burn with bright explosions: its specific gravity is something more than 93. It becomes fluid at about 180° of Fahrenheit, but the exact degree of heat at which it becomes volatile, has not been ascertained.

The chemical phenomena produced by the basis of soda, are in many respects, analogous to those produced by the basis of potash: when exposed to the atmosphere it immediately tarnishes, and by degrees becomes covered with a white crust, which deliquesces much more slowly than the substance that forms the basis of potash, and which proves to be pure soda. The basis combines slowly with oxygen, and without luminous appearance, at all common temperatures, and when heated this combination becomes more rapid, but no light is emitted till it has acquired a temperature nearly to that of ignition. In oxygen gas it burns with a white light: in oxymuriatic acid gas, it burns vividly, with a bright red light; saline matter is formed which proves it to be muriate of soda. When thrown upon water, it produces a violent effervescence, with a loud hissing noise; it combines with the oxygen of the water to form soda which is dissolved, and its hydrogen is disengaged.

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* Portpatrick belongs to Sir D. H. Blair, bart.

The basis of soda acts upon alcohol and ether in the same manner with the basis of potash. The water contained in them is decomposed; soda is rapidly formed, and hydrogen is disengaged. When thrown upon the strong acids, it acts upon them with great energy; if the nitrous acid is employed, a vivid inflammation is produced; with muriatic and sulphuric acids, there is much heat generated, but no light.

It combines with sulphur in close vessels, filled with the vapour of naphtha, with great vividness, with light, heat, and afterwards with explosion from the vaporization of a portion of sulphur, and the disengagement of sulphurated hydrogen gas. The phosphuret has the appearance of lead, and forms phosphate of soda, by exposure to the air, or by combustion. The basis of soda in quantity of one fortieth part renders mercury a fixed solid of the colour of silver, and the combination is attended with a considerable degree of heat. It makes an alloy with tin without changing its colour, and it acts upon lead and gold when heated.

From some very accurate experiments, Mr. Davy has found that 100 parts of potash, consist of 86.1 of the basis, and 13.9 of oxygen: and in 100 parts of soda, there will be 80 parts of the basis, and 20 of oxygen.

To the question, whether the basis of potash and soda should be called metals, Mr. Davy says, that the greater number of philosophical persons answer in the affirmative. They agree with metals in opacity, lustre, malleability, conducting powers, as to heat and electricity, and in their qualities of chemical combination; their low specific gravity does not appear to be a sufficient reason for making them a new class; for among the metals themselves there are remarkable differences in this respect; platina being nearly four times as heavy as tellurium; and in the philosophical division of the classes of bodies, the analogy between the greater number of properties must always be the foundation of arrangement. Hence the basis of the alkalies are denominated, potassium and sodaum.

In reference to his own discoveries, Mr. Davy observes, that, "In the common processes of nature, all the products of living beings may be easily conceived to be elicited from known combinations of matter. The compounds of iron, of the alkalies, and earths with mineral acids, generally abound in soils. From the decomposition of basaltic, porphyretic, and granitic rocks, there is a constant supply of earthy alkaline and ferruginous materials to the surface of the earth. In the sap of all plants that have been examined, certain neutro-saline compounds, containing potash, or soda, or iron, have been found. From plants they may be supplied to animals. And the chemical tendency of organization seems to be rather to combine substances into more complicated and diversified arrangements, than to reduce them to simple elements.

From the fixed alkalies the Professor proceeded to the earths, which are non-conductors of electricity. The alkalies become conducting substances by fusion; the infusible nature of the earths, rendered it impossible to operate upon them in this state: the strong affinity of their basis for oxygen, would not admit of their bodies being acted upon by solution in water; and the only methods that proved successful, were those by which they were operated upon by electricity in some of their combinations, or of combining them at the moment of their decomposition by electricity, in metallic alloys, so as to obtain evidences of their nature and properties.

On this plan, Mr. Davy undertook

a series of experiments on barytes, strontites and lime, employing upon them the same methods as he had used in the decomposition of the fixed alkalies. Gas was, in each case, copiously evolved which was inflammable: and the earths which were in contact with the negative metallic wires became dark-coloured and exhibited small points, having a metallic lustre, which, when exposed to air gradually became white: they became white likewise when plunged under water, and when examined by a magnifier, a greenish powder seemed to separate from them.

He then made mixtures of dry pot-ash in excess, and dry barytes, lime, strontites, and magnesia, brought them into fusion, and acted upon them in the voltaic circuit, as he had done in obtaining the metals of the alkalies. He hoped by this means, that the potassium, and the metals of the earths, might be de-oxygenated at the same time, and enter into combination in alloy. Metallic substances appeared less fusible than potassium, which turned the instant after they had formed, and which, by burning, produced a mixture of potash, and the earth employed. He had found, that when a mixture of potash and the oxides of mercury, tin or lead, was electrified in the voltaic circuit, the decomposition was very rapid and an amalgam on an alloy of potassium was obtained. He tried the same on a mixture of two parts of barytes and one part of oxide of silver, very slightly moistened; when it was electrified by iron wires, an effervescence took place at both points of contact, and a minute quantity of a substance possessing the whiteness of silver, formed at the negative point.

A mixture of barytes and red oxide of mercury, in the same proportions was electrified in the same manner. A small mass of solid amalgam adhered to the negative wire, which evidently contained a substance that produced barytes by exposure to air, with the absorption of oxygen, and which occasioned the evolution of hydrogen from the water, leaving pure mercury, and producing a solution of barytes. Mixtures of lime, strontites, magnesia, and red oxide of mercury treated in the same manner, gave similar amalgams, from which the alkaline earths were regenerated by the action of air and water.

While Mr. Davy was pursuing these experiments, he heard that Professor Berzelius, and Doctor Pontin of Stockholm, had succeeded in decomposing barytes and lime, by negatively electrifying mercury in contact with them, and that in this way they had obtained amalgams of the metals of these earths. Mr. Davy repeated the experiments with a battery of 500 and obtained the most perfect success. The mercury gradually became less fluid, and after a few minutes was covered with a white film of barytes, and when the amalgam was thrown into water, the hydrogen was disengaged, the mercury remained free and a solution of barytes was formed. The result with lime was precisely analogous, so also was that of the strontites; with magnesia it was with more difficulty obtained.

All these amalgams may be preserved a considerable time under naphtha, but in a length of time they become covered with a white crust. When exposed to air, a very few minutes only were required, for the oxygenation of the bases of the earths.

In several cases Mr. Davy exposed the amalgams of the metals of the earths containing a very small quantity of mercury, to the air on a delicate balance, and he always found that during the conversion of the metal into earth, there was a considerable increase of weight. He also found, that, when the metals of the earths were burned in a small quantity of air, they absorbed oxygen, gained weight, and were in a highly caustic and unslacked state; for they produced strong heat by the contact o the water, and did not effervesce during their solution in acids. Hence it is inferred, that the evidence for the composition of the alkaline earths is of the same kind as that for the composition of the common metalic oxides; and the principles of their decomposition are precisely similar; the inflammable matters in all cases, separating at the negative surface in the voltaic circuit, and the oxygen at the positive surface. The professor denominates the metals obtained from the alkaline earths, *barium, strontium, calcium*, and *magnium*.

The professor next tried a number of experiments on the other earths, which were not alkaline, and from the general tenor of these results, and the comparison between the different series of experiments, there seems very great reason to conclude that alumine, zircon glucine, and silex, are, like the alkaline earths metallic oxides. He admits, however that the evidences of decomposition and composition are not of the same strict nature as those that belong to the fixed alkalies and alkaline earths; for it is possible that in the experiments on which silex, alumine, and zircon appeared to separate during the oxidation of the potassium and sodaum, their bases might not actually have been in combination with them, but the earths themselves, in union with the metals of the alkalies, or in mere mechanical mixture.

The strong attraction of potassium, sodaum, and the metals of the alkaline earths for oxygen, led Mr. Davy to examine if their de-oxydating power could not be made to produce the effect of the amalgamation of ammonia, independently of the agency of electricity; and he found, that, when mercury, united to a small quantity of potassium, sodaum, barium or calcium, was made to act upon moistened muriate of ammonia, the amalgam rapidly increased to six or seven times its volume, and the compound seemed to contain much more ammonaical basis than that procured by electrical powers.

The amalgam from ammonia, when formed at the temperature of 70° or 80°, is a soft solid, of the consistence of butter; at the freezing temperature it becomes firmer and a crystallized mass, and its specific gravity below 3. When exposed to air, it soon becomes covered with a white crust, which proves to be carbonate of ammonia.

"The more," says Mr. Davy, "the properties of the amalgam, obtained from ammonia, are considered, the more extraordinary do they appear. Mercury, by combination with about the $\frac{1}{12000}$ part of its weight of new matter is rendered solid, yet its specific gravity diminished from 13. 5 to less than 3, and it retains all its metallic characters; its colour, lustre, opacity, and conducting powers, remaining unimpaired. It is scarcely possible to conceive, that a substance which forms with mercury so perfect an amalgam, should not be metallic in its own nature; hence it is denominated ammonium."

From the preceding facts, the following questions have occurred: On what do the metallic properties of ammonium depend? Are hydrogen and nitrogen, both metals in the aëriform state, at the usual temperature of the atmosphere, bodies of the same character as zinc and quicksilver would be in the heat of ignition? Or, are these gasses in their common form, oxides, which become metallized by de-oxidation? Or, are they simple bodies, not metallic in their own nature, but capable of composing a metal in their de-oxygenated, and an alkali in their oxygenated state?

Assuming the existence of hydrogen, in the amalgam of ammonium, its presence in one metallic compound evidently leads to the suspicion of its combination in others. And in the electrical powers of the different species of matter, there are circumstances that extend the idea to combustible substances in general. Oxygen is the only body which can be supposed elementary, attracted by the positive substance in the electrical circuit; and all compound bodies, the nature of which is known, that are attracted by the surface, contain a considerable proportion of oxygen. Hydrogen is the only matter attracted by the negative surface, which can be considered as acting the opposite part to oxygen; "may not then," says the Professor, "the different inflammable bodies contain this as a common element?"

Should future experiments prove the truth of this hypothesis, still the alkalies, the earths and the metallic oxides, will belong to the same class of bodies. From platina to potassium there is a regular order of gradation as to their physical and chemical properties, and this would probably extend to ammonium, could it be obtained in the fixed form. Platina and gold, in specific gravity, degree of oxydability, and other qualities, differ more from arsenic, iron, and tin than these last do from barium and strontium. The phenomona of combustion of all oxydable metals, are precisely analogous. In the burning in air, potassium forms an alkali, and calcium an earth; in a manner similar to that in which osmium forms a volatile and acrid substance by absorption of oxygen, does the amalgam of ammonium produce the volatile alkali? and, if we suppose the ammonia is metallized, by being combined with hydrogen, and freed from water, the same reasoning will apply to the other metals, with this difference, that the adherence of their phlogiston of hydrogen, would be exactly in the inverse ratio of their attraction for oxygen. In platina it would be combined with the greatest energy; in ammonium with the least; and if it be separable from any of the metals, without the aid of a new combination, we may expect that this result will be afforded by the most volatile and oxydable, such as arsenic, or other metals of the fixed alkalies, submitted to intense heat under electrical polarities, and having the pressure of the atmosphere removed.

Mr. Davy concludes by hoping, that the new facts which he has discovered, may admit of many applications, and explain some phenomena in nature. "The metals of the earths," he says, "cannot exist at the surface of the globe; but it is very possible that they may form a part of the interior; and such an assumption would offer a theory for the phenomena of volcanoes, the formation of lavas, and the effects and excitements of subterraneous heat; for let it be granted that the metals of the earths and alkalies, in alloy with common metals, exist in large quantities beneath the surface; then their accidental exposure to the action of the air and water must produce the effect of subterranean fire, and a product of earthy and stony matters analogous to lavas.

"The luminous appearance of those meteors, connected with the fall of stones is one of the extraordinary circumstances of these wonderful phenomena. This effect may be accounted for, by supposing that the substances which fall, come into our atmosphere in a metallic state, and that the earths of which they principally consist are the results of combustion."

At the meeting of the Royal Society, Feb. 2, a most curious and interesting paper, by Mr. Davy, was read, giving an account of various experiments on the action of potassium on ammonia, from which it appears, that a considerable quantity of nitrogen can be made to disappear, and can be regenerated. When it disappears, nothing can be obtained in its place but oxygen, and hydrogen; and when it is formed, its elementary matter is furnished by water.

For the Belfast Monthly Magazine.

IN the tale of "the Cottagers of Glenburnie," honourable and deserved notice is taken of David Manson, who so long and so successfully filled the respectable situation of instructor of youth in the town of Belfast. He may be considered the precursor of Lancaster, in facilitating the modes of instruction. I would be highly gratified if any of your readers would furnish, through your Miscellany, a sketch of his life, and particularly of the modes of instructing and managing youth, which he so advantageously practised.

As biography may be made so very useful in conveying lessons both to young and old, I wish to see many of your pages filled with interesting accounts of persons eminent in their respective lines. They who have been residents in your town or province, have peculiar claims on your notice; the memoirs of such might have a good effect in stimulating others to follow virtuous examples. K.

For the Belfast Monthly Magazine.

ON THE DECOMPOSITION OF THE EARTHS.

IN arts and sciences the progress of discovery has been extremely slow, some of these have arrived early at comparative perfection, while others remained for ages in a state of infancy, involved in the darkest obscurity, or confined to some very erroneous principles. It is curious to reflect, that though the science of chemistry was